

Serial No. 10/044,358

REMARKS

This amendment is responsive to the Official Action dated March 31, 2002.

Claims 1 - 29 were pending in the application.

Claims 1 - 29 were subject to a restriction requirement.

By way of this amendment, the Applicant has added new claims 30-41.

Claims 1- 41 remain pending in the Application.

RESPONSE TO RESTRICTION:

Claims 1-29 were subject to a restriction requirement under 35 USC §121.

The Examiner divided the claimed subject matter by reference to the embodiments as shown in the drawing figures:

The species were identified as follows:

Embodiment 1 as described in Fig. 4.

Embodiment 2 as described in Fig. 5.

Embodiment 3 as described in Fig. 6.

Embodiment 4 as described in Fig. 7.

Embodiment 5 as described in Fig. 8.

Embodiment 6 as described in Fig. 9.

Applicant hereby elects, without traverse, to prosecute the species identified as Embodiment 5 (Fig. 8). The Applicant believes that claims 1, 2, and 7-29 read on the elected species.

DISCUSSION:

Figs. 1 and 7 respectively illustrate short wavelength and long wavelength VCSEL structures in which the present invention can be utilized. Fig. 3 illustrates a conventional DBR with $\frac{1}{4}$ wavelength mirror periods. Figs. 4, 5, 6, 8 and 9 illustrate various configurations of the invention with non-quarter wavelength mirror periods. However the

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non-quarter wave binary mirror pairs still hold to the $\frac{1}{2}$ wavelength (or multiple thereof) mirror pair rule to maximize optical reflectivity.

The main idea of the invention is to improve the thermal conductivity or thermal performance of the VCSEL structure by placing a thicker mirror period of a higher thermally conductive material adjacent to the optical cavity (where the heat is generated). AlAs has a thermal conductivity which is 2-3 times greater than GaAs, and likewise GaAs and AlAs are better than AlGaAs. According to the invention, a mirror period of AlAs having a thickness greater than $\frac{1}{2}$ wavelength, is placed adjacent to the optical cavity for the purpose of spreading heat laterally through the VCSEL structure and thus improving thermal performance. Each of Figs. 4, 5, 6, 8 and 9 illustrate this same concept.

Applicant has added new claims 30-41 which are believed to be generic to all embodiment. Review and consideration is respectfully solicited.

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PETITION FOR EXTENSION OF TIME:

MAY 30 2003

A petition for an extension of time of one month is attached.

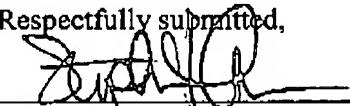
TECHNOLOGY CENTER 2800

Accordingly, the Application is now believed to be in proper condition for examination on the merits.

Corresponding action is respectfully solicited.

PTO is authorized to charge any additional fees incurred as a result of the filing hereof or credit any overpayment to our account #02-0900.

Respectfully submitted,


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Title: LOW THERMAL IMPEDANCE DBR FOR
OPTOELECTRONIC DEVICES
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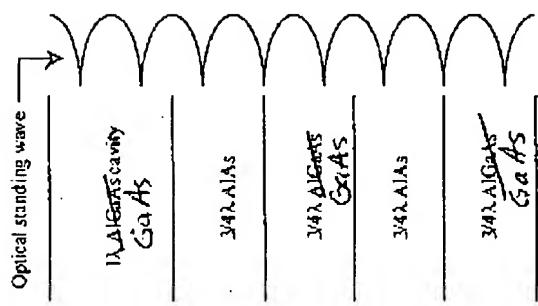


FIG. 9

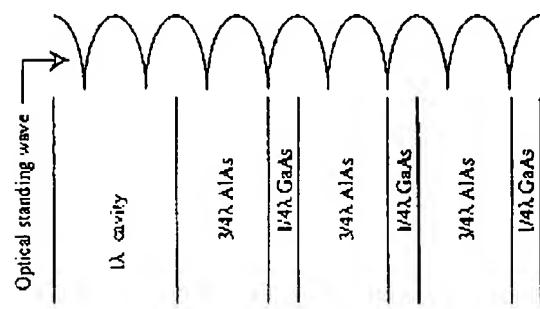


FIG. 8